

THE STAR FORMATION HISTORY OF ORION AND ITS ENVIRONS

NAG5-10545

Annual Report No. 4

For the Period 15 March 2004 through 14 March 2005

Principal Investigator

Dr. Nuria Calvet

February 2005

Prepared for

**National Aeronautics and Space Administration
Goddard Space Flight Center, Greenbelt, MD**

**Smithsonian Institution
Astrophysical Observatory
Cambridge, Massachusetts 02138**

The Smithsonian Astrophysical Observatory is a member of the Harvard-Smithsonian Center for Astrophysics
--

Annual Report for Proposal NAG5-10545

The Star Formation History of Orion and Its Environs

PI: N. Calvet

During the period of performance, we have obtained the following observations and carried out the analysis of the Orion associations itemized below.

Detailed analysis of newly discovered stars in strips at declinations $+1$ degree and -1 degree. The first paper of the series "The CIDA Variability Survey of Orion OB1" was submitted and accepted (Briceño et al. 2005). In this paper, we discuss the stellar properties and spatial distribution of 197 new low mass stars belonging to the subassociations OB1a and OB1b, confirming their ages as 7-10 Myr and 3-5 Myr, respectively. We find that the number of Classical T Tauri stars (CTTS) decreases sharply between Ori 1b and Ori 1a. This seems to indicate that disks dissipate rapidly by ~ 5 Myr.

Disk evolution in the Ori OB1 association. We analyzed multi-band photometry of a subsample of low mass stars in the associations Ori OB1a and 1b. We estimated mass accretion rates from the excess luminosity at U , and found that they are consistent with determinations for a number of other associations, with or without high mass star formation. We found a decrease of disk emission with age, which implied that significant grain growth and settling toward the midplane has taken place in the inner disks of Ori OB1. This results have been presented in Calvet et al. (2005).

Spitzer proposal. We submitted and were granted time to observe two fields in Ori OB1a and 1b with IRAC and MIPS, instruments on board Spitzer. The observations will be carried out in 2005.

Multifiber echelle spectroscopy: We analyzed the field of the Orion Nebula Cluster which was observed with the multifiber Hectochelle on the MMT in December 2003. A total of 237 spectra were analyzed. We found 15 new members. We studied rotational velocities and confirmed the difference previously reported from period analysis between accreting and non-accreting stars. We measured radial velocities and found that their small dispersions are consistent with estimates from proper motions (Sicila-Aguilar et al. 2005).

Slit spectroscopy of bright candidates: Spectra for some 700 candidate PMS stars were obtained with the FAST spectrograph at the SAO 1.5m telescope in Mt. Hopkins. The spectra are being analyzed

Other multifiber spectroscopy: We analyzed the spectra of 600 stars obtained with Hydra on the WYN telescope, finding ~ 150 new members. We also obtained spectra of nearly 800 stars with the multifiber spectrograph Hectospec in November 2004. The spectra are presently being analyzed. A paper is in preparation.

UBVRI photometry: We obtained UBVRI photometry with the 4-shooter CCD Mosaic Camera at the SAO 1.2m telescope at the beginning of December 2004. Although the weather was poor, we obtained spectra for ~ 10 fields. The photometry is presently being analyzed.

Near and mid-IR photometry: We were granted 8 nights in December of 2004 in the IR

Camera on the SAO 1.2m telescope to obtain L-band photometry. The weather was poor and no data was obtained.

Briceño, C., Calvet, N., Hernandez, J., Vivas, A.K., Hartmann, L., Downes, J.J., & Berlin, P. 2005, AJ, in press

Calvet, N., Briceño, C., Hernández, J., Hoyer, S. et al. 2005, AJ, in press

Sicilia-Aguilar, A., Hartmann, L., Szentgyorgyi, A. H., Fabricant, D.G., Furesz, G., Roll, J., M. A., Calvet, N., Tokarz, S.,
& Hernandez, J. 2005, AJ, in press